Manual

VN8810

Wireless Interface for CAN/LIN/K-Line and DoIP

Version 1.1
English

Imprint

Vector Informatik GmbH
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1 Introduction

In this chapter you find the following information:

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1.1 Safety Instructions and Hazard Warnings

Caution: In order to avoid personal injuries and damage to property, you have to read and understand the following safety instructions and hazard warnings prior to installation and use of this interface. Keep this documentation (manual) always near the interface.

1.1.1 Proper Use and Intended Purpose

Caution: The interface is designed for analyzing, controlling and otherwise influencing control systems and electronic control units. This includes, inter alia, bus systems like CAN, LIN, K-Line, MOST, FlexRay, Ethernet, BroadR-Reach and/or ARINC 429.

The interface may only be operated in a closed state. In particular, printed circuits must not be visible. The interface may only be operated (i) according to the instructions and descriptions of this manual; (ii) with the electric power supply designed for the interface, e.g. USB-powered power supply; and (iii) with accessories manufactured or approved by Vector.

The interface is exclusively designed for use by skilled personnel as its operation may result in serious personal injuries and damage to property. Therefore, only those persons may operate the interface who (i) have understood the possible effects of the actions which may be caused by the interface; (ii) are specifically trained in the handling with the interface, bus systems and the system intended to be influenced; and (iii) have sufficient experience in using the interface safely.

The knowledge necessary for the operation of the interface can be acquired in workshops and internal or external seminars offered by Vector. Additional and interface specific information, such as „Known Issues“, are available in the „Vector KnowledgeBase“ on Vector´s website at www.vector.com. Please consult the „Vector KnowledgeBase“ for updated information prior to the operation of the interface.

1.1.2 Hazards

Caution: The interface may control and/or otherwise influence the behavior of control systems and electronic control units. Serious hazards for life, body and property may arise, in particular, without limitation, by interventions in safety relevant systems (e.g. by deactivating or otherwise manipulating the engine management, steering, airbag and/or braking system) and/or if the interface is operated in public areas (e.g. public traffic, airspace). Therefore, you must always ensure that the interface is used in a safe manner. This includes, inter alia, the ability to put the system in which the interface is used into a safe state at any time (e.g. by „emergency shutdown“), in particular, without limitation, in the event of errors or hazards.

Comply with all safety standards and public regulations which are relevant for the operation of the system. Before you operate the system in public areas, it should be tested on a site which is not accessible to the public and specifically prepared for performing test drives in order to reduce hazards.

1.1.3 Disclaimer

Caution: Claims based on defects and liability claims against Vector are excluded to the extent damages or errors are caused by improper use of the interface or use not according to its intended purpose. The same applies to damages or errors arising from insufficient training or lack of experience of personnel using the interface.

1.2 About this User Manual

Conventions

In the two following charts you will find the conventions used in the user manual regarding utilized spellings and symbols.

Style	Utilization
bold	Blocks, surface elements, window- and dialog names of the software. Accentuation of warnings and advices. **[OK]** Push buttons in brackets **File|Save** Notation for menus and menu entries
Microsoft	Legally protected proper names and side notes.
`Source Code`	File name and source code.
Hyperlink	Hyperlinks and references.
<CTRL>+<S>	Notation for shortcuts.

Symbol	Utilization
	Here you can obtain supplemental information.
	This symbol calls your attention to warnings.
	Here you can find additional information.
	Here is an example that has been prepared for you.
	Step-by-step instructions provide assistance at these points.
	Instructions on editing files are found at these points.
	This symbol warns you not to edit the specified file.

1.2.1 Certification

Certified Quality Management System

Vector Informatik GmbH has ISO 9001:2008 certification. The ISO standard is a globally recognized standard.

1.2.2 Warranty

Restriction of warranty

We reserve the right to change the contents of the documentation and the software without notice. Vector Informatik GmbH assumes no liability for correct contents or damages which are resulted from the usage of the documentation. We are grateful for references to mistakes or for suggestions for improvement to be able to offer you even more efficient products in the future.

1.2.3 Registered Trademarks

Registered trademarks

All trademarks mentioned in this documentation and if necessary third party registered are absolutely subject to the conditions of each valid label right and the rights of particular registered proprietor. All trademarks, trade names or company names are or can be trademarks or registered trademarks of their particular proprietors. All rights which are not expressly allowed are reserved. If an explicit label of trademarks, which are used in this documentation, fails, should not mean that a name is free of third party rights.

> Windows, Windows 7, Windows 8.1
> are trademarks of the Microsoft Corporation.

2 Device Description

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2.1 Scope of Delivery

Contents

The delivery includes:

- VN8810 Intelligent Diagnostic Device
- WiFi Antenna (2x)
- USB3.0 cable (A-B, 1.8 m)
- VN8800 Device Manager CD
- Quick Start Guide

2.2 Introduction

General information

The VN8810 is a network interface for CAN/LIN/K-Line as well as DoIP (Diagnostics over Internet Protocol). It enables the standalone execution of applications like reprogramming of ECUs, execution of scripts or remote access for diagnostic use cases.

Connectivity options to the infrastructure are provided by Ethernet, USB and WiFi (802.11 a/b/g/n, 2.4 GHz and 5 GHz). One single and robust connector is used to access the vehicles via OBD-II.

Figure 1: Front and back side of the VN8810

Highlights

Main features of the VN8810 interface are:

- CAN High-Speed channel with support of CAN FD incl. internal and switchable CANterm (120 Ohm)
- LIN channel (supporting K-Line)
- DoIP Activation Line
- Bicolor LEDs for status and bus activities
- Key pad for operation
- Buzzer for audible feedback
- USB3.0 host connector for 3G/4G devices
- Hardware time synchronization of multiple Vector network interfaces (CAN, LIN, FlexRay, Ethernet)
- Robustness, power supply and temperature ranges suitable for automotive and industrial applications

2.3 Stand-Alone Mode

General information

The VN8810 network interface offers the standalone operation without any additional user PC. For this purpose, user applications and configurations can be stored on the internal CFast card. After a restart of the VN8810, the application can be selected and loaded. Afterwards, the application can be executed.

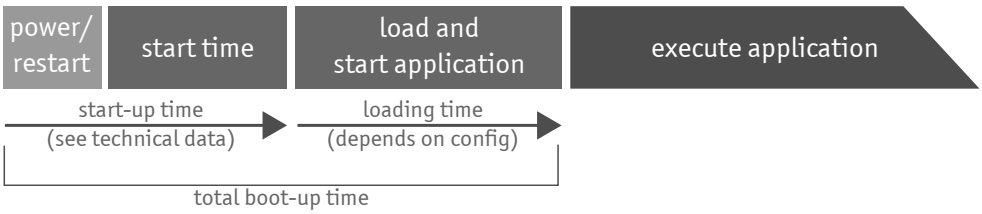


Figure 2: Boot-up time of the VN8810

2.4 Accessories

Reference: Information on available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

2.5 Examples of Usage

2.5.1 Flash Reprogramming

Description

One major use case of the VN8810 is standalone flash reprogramming. In this setup, the flash packages (containing flash configuration and flash data) are stored on the CFast card inside the VN8810. When the VN8810 is connected to the vehicle with an appropriate OBD cable, the flash reprogramming can be executed on the device. Alternatively, the flash reprogramming can be executed and monitored through a mobile device.

Setup

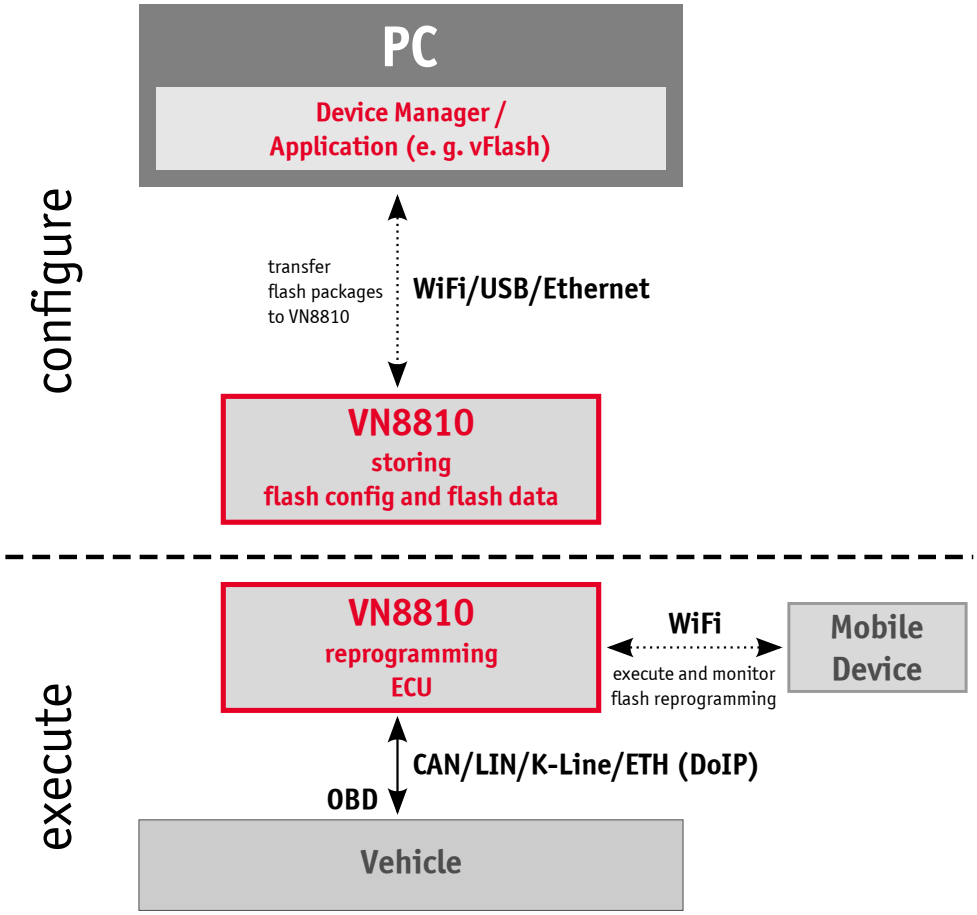


Figure 3: Flash reprogramming of vehicles

Reference: Please find further information on standalone applications in the related manuals, e. g. vFlash user manual.

2.6 Getting Started

2.6.1 Step 1: Driver Installation

Please use the drivers from the included Vector Driver Disk.

1. Execute Vector Driver Setup from the auto start menu or directly from `\Drivers\Setup.exe` before the network interface is connected to the PC with the included USB cable. If you have already connected the network interface, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.
2. Finish the driver installation with the setup.

Reference: Further information on the driver installation can be found in section Driver Installation on page 26.

2.6.2 Step 2: Device Installation

1. Install the drivers as described before.
2. Connect the network interface to a free USB3.0 port via the USB cable.
3. Power-up the device by supplying external voltage (e.g. with an appropriate cable offered by Vector). The device is ready for operation now.

2.6.3 Step 3: Device Configuration

Configuration

Before the installed device can be used in an application, it must be properly configured for the needed use case. This configuration is done with the **Vector Hardware Config** tool which comes with the driver installation. The tool can be found in **Windows | Start | Settings | Control Panel | Vector Hardware** and manages all installed Vector devices.

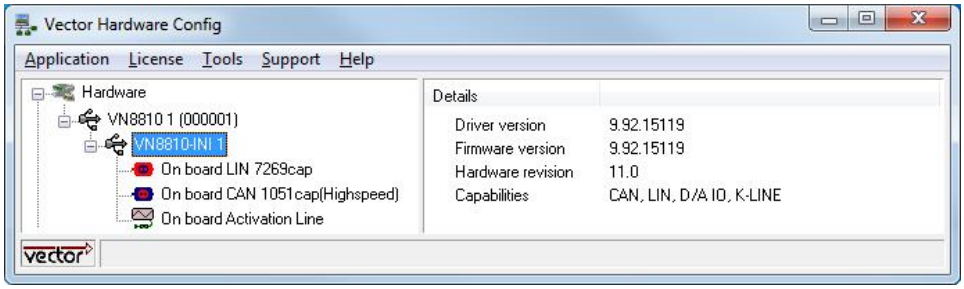


Figure 4: Vector Hardware Config

Reference: Further details on the **Vector Hardware Config** tool can be found in the installation instructions (see section Vector Hardware Configuration on page 30).

2.6.4 Step 4: WiFi/ETH Configuration

Device Management

The VN8810 needs to be configured for WiFi and Ethernet as well. This configuration requires **Vector Device Manager** which is installed with your application (e. g. vFlash Compact).

Reference: Further details on **Vector Device Manager** can be found in the related user manual.

2.7 User Interface

VN8810 user interface

Figure 5: Key pad and bicolor LEDs on the front side

Push buttons

> **Start/Stop**
Starts or stops measurement.

> **Multi purpose**
Application specific multi purpose key pad.

LED P1...P5

Color	Description
Green, orange, red	Application specific.

LED CAN

Color	Description
Green	Data frames have been sent or received correctly. Flashing frequency depends on the data traffic.
Orange	Error frames have been sent or received. Flashing frequency depends on the data traffic.
Red	Bus off.
Off	No data traffic.

LED K-Line / LIN

Color	Description
Green	Data frames have been sent or received correctly.
Orange	Data traffic with at least one error.
Red	Error.
Off	No data traffic.

LED ETH

Color	Description
Green, orange, red	Application specific information on link status and activity.

LED WiFi

Color	Description
Green, orange, red	Application specific information on link status and activity.

LED Status

Color	Description
Green	Device is ready for operation/running measurement.
Orange	Initializing or updating software. Please wait.
Red	Error. Device not working.
Off	Device off.

2.8 Connectors and CANterm

Description

Figure 6: Connectors on the back side

> **WiFi antenna connectors [1, 7]**
Use both SMA connectors to attach the WiFi antennas.

Note: To keep conformity with international laws, use only antennas provided by Vector!

> **USB3.0 host [2]**
Use this connector for 3G/4G devices.

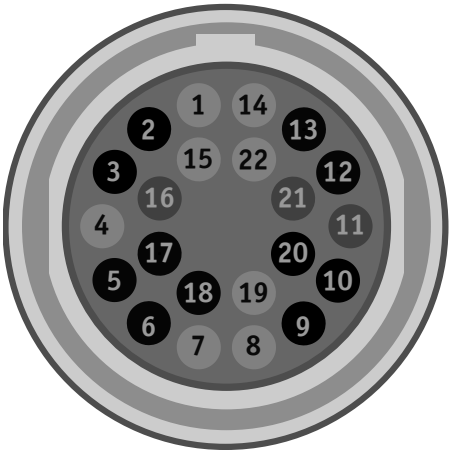
> **Hardware sync connector [3]**
This connector (Binder type 711) can be used for time synchronization of different Vector devices (see section Time Synchronization on page 22). **The sync connector is not intended to connect a power supply.**

Pin	Assignment
1	Not connected
2	Synchronization line
3	Ground

> **USB3.0 device [4]**
Connect your PC and the VN8810 via USB for installation and configuration. Use the high-class and USB3.0 compliant cable found in the delivery (other USB cables and extensions of lower quality may generate faults).

> **Main connector [5]**
The VN8810 has a 22-pin ODU connector with the following pin assignment:

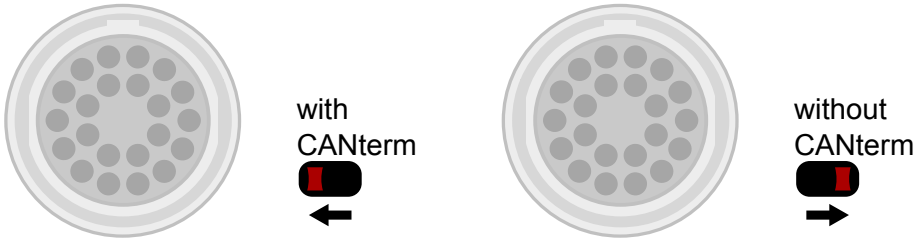
Pin	Assignment
1	Ethernet TX (-)
2	Reserved
3	Reserved
4	DoIP Act. Line
5	Chassis GND
6	Voltage Plus
7	CAN GND
8	CAN High
9	LIN GND
10	VBatt LIN
11	Not connected
12	Reserved
13	Reserved
14	Ethernet RX (-)
15	Ethernet TX (+)
16	Not connected
17	Chassis GND
18	Voltage Plus
19	CAN Low
20	LIN / K-Line
21	Not connected
22	Ethernet RX (+)



Note: LIN requires an external voltage supply which is directly provided by the OBD-cable VN88(A). If you intend to use the Breakout Box VN88, please connect an external voltage of 5 V…36 V DC to pin 9 (VBatt LIN) and pin 3 (LIN GND) at the D-SUB9 connector.

Reference: Information on available accessories can be found in the separate accessories manual on the driver CD in `\Documentation\Accessories`.

> **CAN High-Speed Termination [6]**
At the back side, the network interface has a CANterm selector that can be used to disable or enable a 120 Ohm termination for CAN High-Speed. By default, CANterm is enabled:



2.9 CFast Card

CFast card

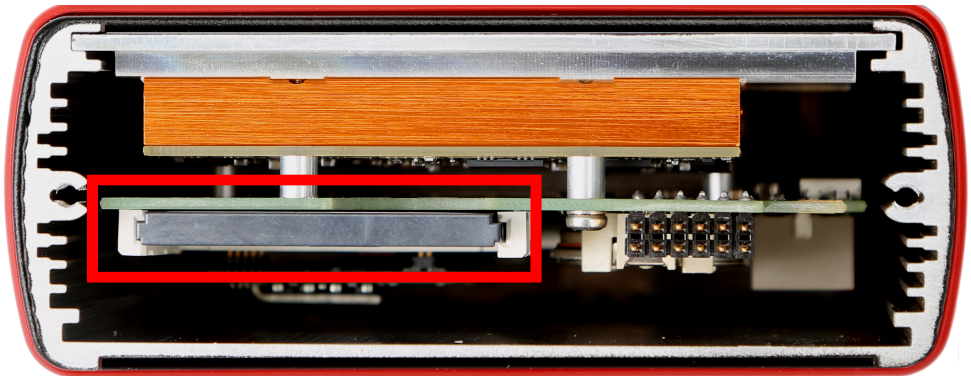


Figure 7: Opened VN8810 with inserted CFast card

The VN8810 is delivered with a CFast card which stores the operating system, the applications and user data. This CFast card must not be removed during operation.

Note: The CFast card should only be removed for system recoveries. Please contact the Vector support for further instructions on system recoveries.

2.10 Technical Data

CAN channel	TJA1051 (capacitively decoupled), CAN High-Speed: 2 Mbit/s CAN FD: up to 8 Mbit/s
LIN channel (supporting K-Line)	TLE7269 (capacitively decoupled), Normal mode: 20 kbit/s Flash mode: 115 kbit/s* *Depending on the bus physics, the maximum data rate can be up to 330 kbit/s.
DoIP	Fast Ethernet 100 Mbit incl. DoIP Activation Line
PC/infrastructure interface	USB3.0 SuperSpeed WiFi 802.11 a/b/g/n (2.4 GHz and 5 GHz), up to 300 Mbit/s
Host interface	USB3.0 SuperSpeed, e. g. to connect to 3G/4G USB devices
Memory	8 GB CFast card
Key pad	With two push buttons
Bicolor LED	Ten bicolor LEDs for status and bus activities, possible colors: green, red and orange
CANterm	Switchable 120 Ohm terminating resistor
Power supply	6 V ... 36 V, via main connector
Power consumption	Typ. < 9 W Max. approx. 16 W
Start-up time	< 20 seconds
Temperature range **(ambient temperature of the device)**	Operation: -40 °C ... +50 °C Storage: -40 °C ... +85 °C
Relative humidity of ambient air	15 %...95 %, non-condensing
Weight	Approx. 800 g
Dimensions (LxWxH)	Approx. 170 x 110 x 45 mm (without antennas)
Operating system requirements	Windows 7 (32 bit / 64 bit) Windows 8.1 (32 bit / 64 bit)

3 Common Features

In this chapter you find the following information:

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3.1 Time Synchronization

3.1.1 General Information

Time stamps and events

Time stamps are useful when analyzing incoming or outgoing data or event sequences on a specific bus.

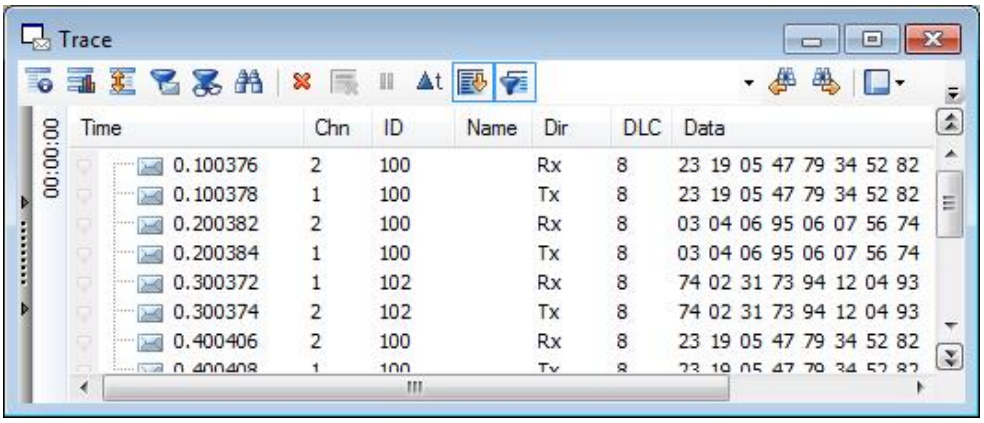

Figure 8: Time stamps of two CAN channels in CANalyzer

Generating time stamps

Each event which is sent or received by a Vector network interface has an accurate time stamp. Time stamps are generated for each channel in the Vector network interface. The base for these time stamps is a common hardware clock in the device.

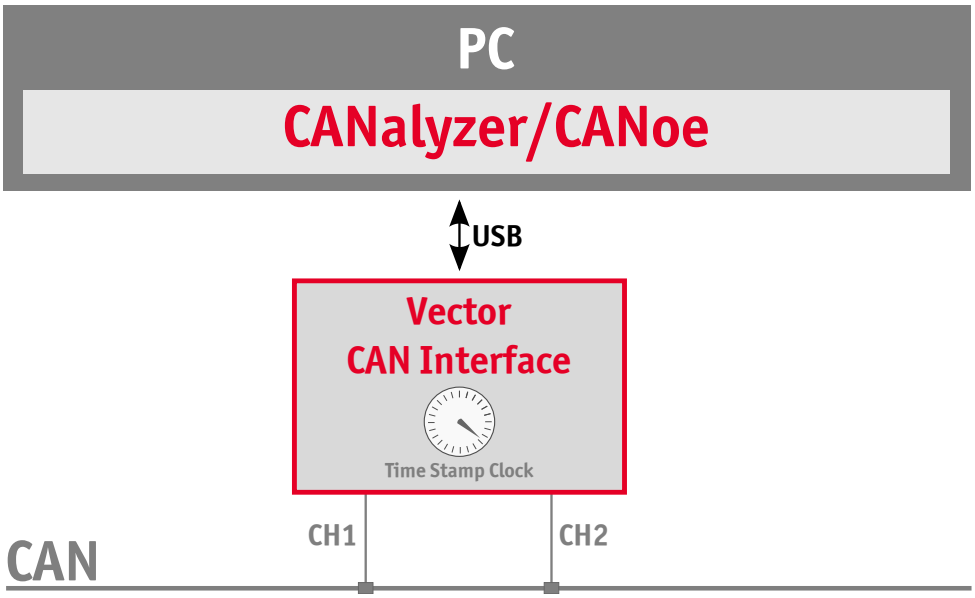

Figure 9: Common time stamp clock for each channel

If the measurement setup requires more than one Vector network interface, a synchronization of all connected interfaces and their hardware clocks is needed.

Due to manufacturing and temperature tolerances, the hardware clocks may vary in speed, so time stamps of various Vector devices drift over time.

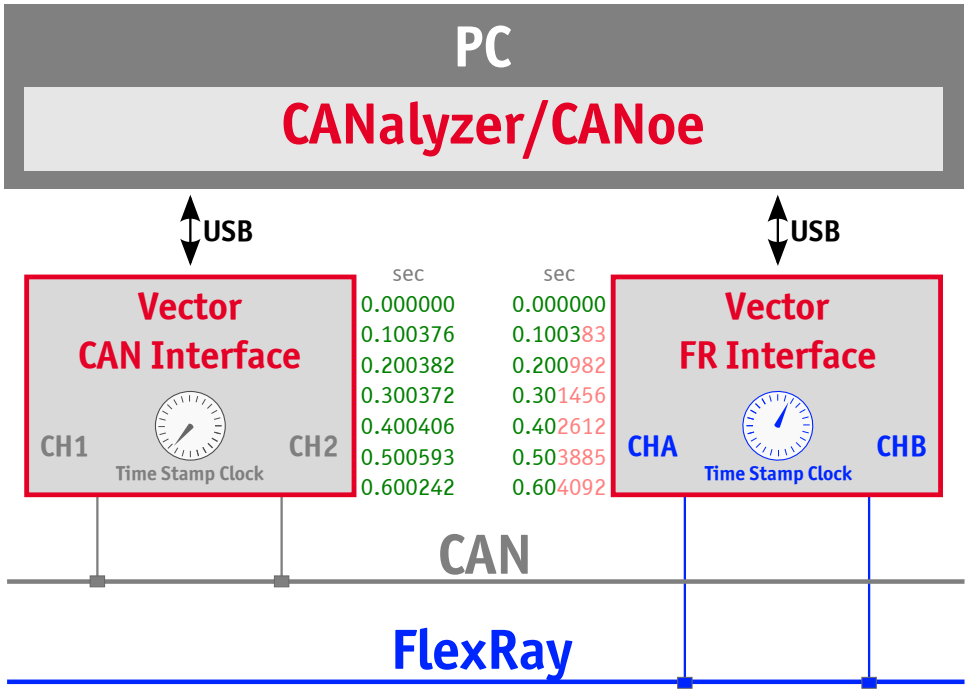

Figure 10: Example of unsynchronized network interfaces. Independent time stamps drift apart

To compensate for these time stamp deviations between the Vector network interfaces, the time stamps can be either synchronized by software or by hardware (see next section).

Note: The accuracy of the software and hardware sync depends on the interface. Further information on specific values can be found in the technical data of the respective devices.

3.1.2 Software Sync

Synchronization by software

The software time synchronization is not available for this device. Please use the hardware time synchronization instead (see section Hardware Sync on page 24).

3.1.3 Hardware Sync

Synchronization by hardware

A more accurate time synchronization of multiple devices is provided by the hardware synchronization which has to be supported by the application (e. g. CANalyzer, CANoe). Two Vector network interfaces can therefore be connected with the SYNC-cableXL (see accessories manual, part number 05018).

In order to synchronize up to five devices at the same time, a distribution box is available (see accessories manual, part number 05085).

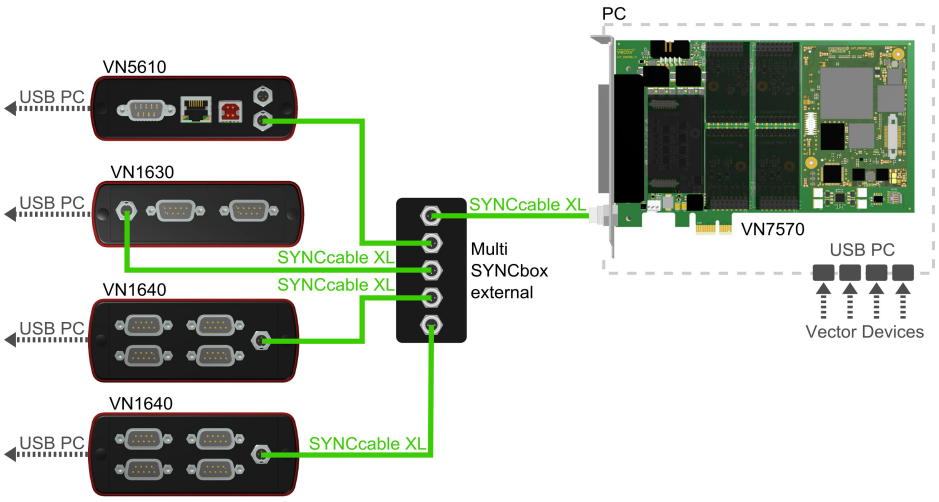

Figure 11: Example of a time synchronization with multiple devices

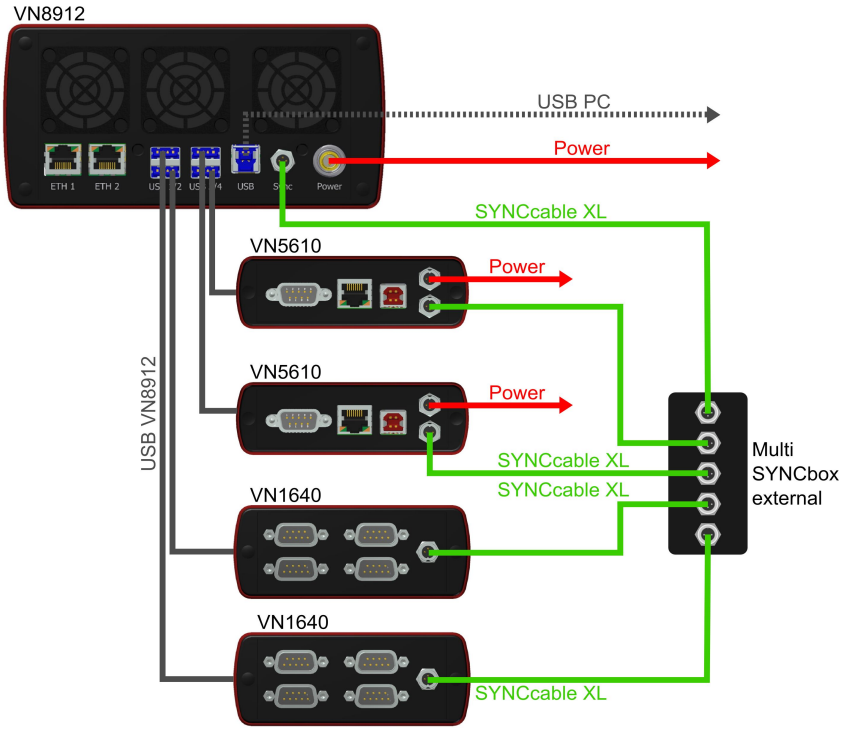

Figure 12: Example of a time synchronization with VN8912 and additional devices

At each falling edge on the sync line which is initiated by the application, the Vector network interface generates a time stamp that is provided to the application. This

allows the application to calculate the deviations between the network interfaces and to synchronize the time stamps to a common time base (master clock) which is defined by the application.

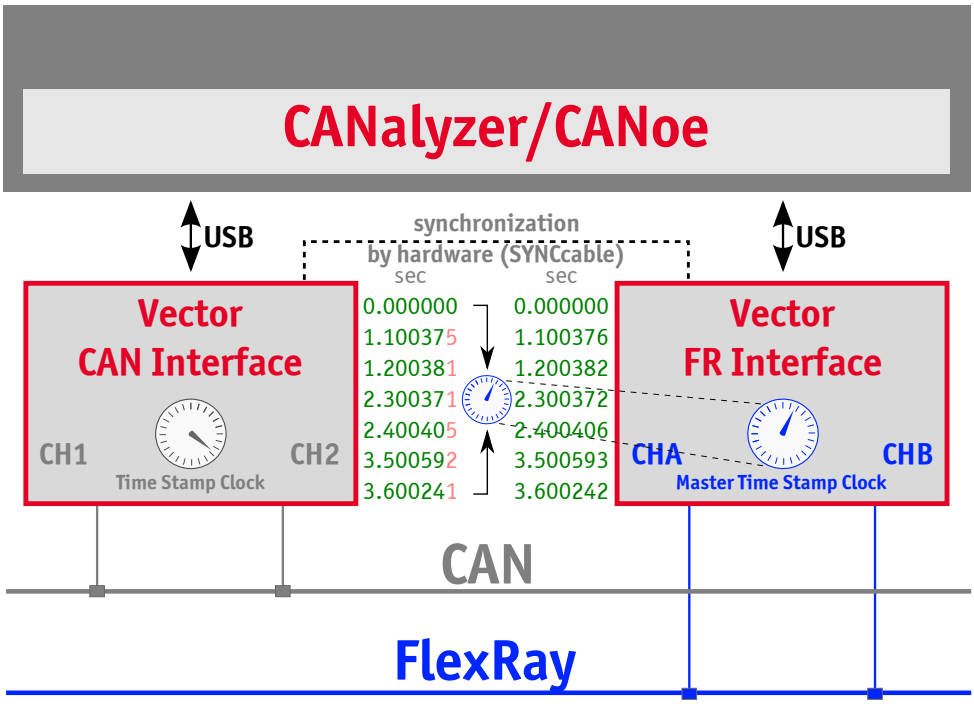

Figure 13: Time stamps are synchronized to the master clock

Note: The hardware synchronization must be supported by the application. For further information please refer to the relevant application manual. Please note that the software synchronization must be disabled (see **Vector Hardware Config | General information | Settings | Software time synchronization**) if the hardware synchronization is used.

4 Driver Installation

In this chapter you find the following information:

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4.2 Driver Installation on the Device **29**

4.1 Vector Driver Setup

General information

The Vector Driver Disk offers a driver setup which allows the installation or the removal of Vector devices.

Note: Please note that you will need **Administrator Rights** for the following steps.

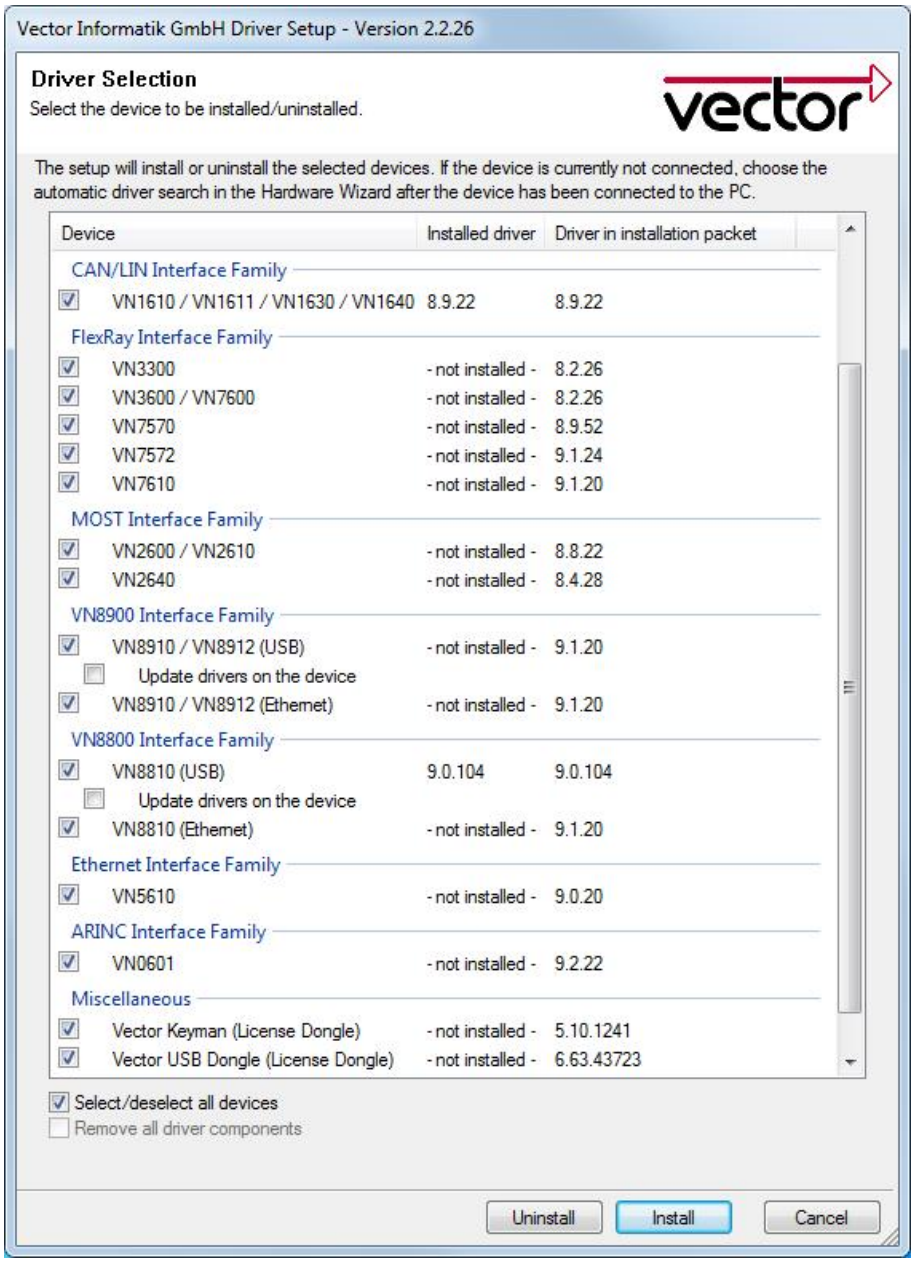
1. Execute the driver setup from the autostart menu or directly from `\Drivers\Setup.exe` before the device is connected to the PC with the included USB cable.

   If you have already connected the device to the PC, the **Windows found new Hardware** wizard appears. Close this wizard and then execute the driver setup.

Vector Informatik GmbH Driver Setup - Version 2.2.27
vector
Welcome to Vector Driver Setup!
This program will install Vector Drivers on your computer.
Click 'Next' to continue with the setup program.
Please close all open applications before proceeding!
Next >
Cancel

2. Click **[Next]** in the driver setup dialog. The initialization process starts.

3. In the driver selection dialog, select your devices to be installed (or to be uninstalled).


Vector Informatik GmbH Driver Setup - Version 2.2.26
Driver Selection
Select the device to be installed/uninstalled.
vector
The setup will install or uninstall the selected devices. If the device is currently not connected, choose the automatic driver search in the Hardware Wizard after the device has been connected to the PC.
Device
Installed driver
Driver in installation packet
CAN/LIN Interface Family
VN1610 / VN1611 / VN1630 / VN1640 8.9.22 8.9.22
FlexRay Interface Family
VN3300 - not installed - 8.2.26
VN3600 / VN7600 - not installed - 8.2.26
VN7570 - not installed - 8.9.52
VN7572 - not installed - 9.1.24
VN7610 - not installed - 9.1.20
MOST Interface Family
VN2600 / VN2610 - not installed - 8.8.22
VN2640 - not installed - 8.4.28
VN8900 Interface Family
VN8910 / VN8912 (USB) - not installed - 9.1.20
Update drivers on the device
VN8910 / VN8912 (Ethernet) - not installed - 9.1.20
VN8800 Interface Family
VN8810 (USB) 9.0.104 9.0.104
Update drivers on the device
VN8810 (Ethernet) - not installed - 9.1.20
Ethernet Interface Family
VN5610 - not installed - 9.0.20
ARINC Interface Family
VN0601 - not installed - 9.2.22
Miscellaneous
Vector Keyman (License Dongle) - not installed - 5.10.1241
Vector USB Dongle (License Dongle) - not installed - 6.63.43723
Select/deselect all devices
Remove all driver components
Uninstall
Install
Cancel

4. Click **[Install]** to execute the driver installation, or **[Uninstall]** to remove existing drivers.

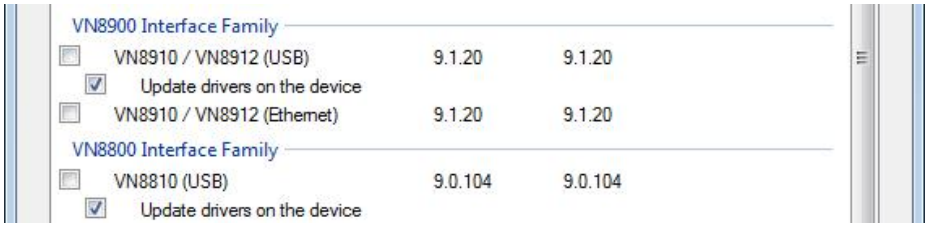
5. A confirmation dialog appears. Click **[Close]** to exit.
After successful installation, the device is ready for operation and can be connected to the PC with the included USB cable and powered by supplying external voltage (e. g. with an appropriate cable offered by Vector).

4.2 Driver Installation on the Device

General information

After installing the device driver on your PC we also recommend to update the driver on the Vector network interface. Follow these instructions to update the drivers on your device.

1. Connect the device to the PC via USB and power it up by supplying external voltage (e. g. with an appropriate cable offered by Vector).
2. Close the **Windows found new Hardware** wizard if it appears.
3. Again, execute the driver setup from the autostart menu or directly from `\Drivers\Setup.exe`.
4. Click **[Next]** in the driver setup dialog. The initialization process starts.
5. In the driver selection dialog, select the related option **Update drivers on the device** for your device.


VN8900 Interface Family
VN8910 / VN8912 (USB) 9.1.20 9.1.20
Update drivers on the device
VN8910 / VN8912 (Ethernet) 9.1.20 9.1.20
VN8800 Interface Family
VN8810 (USB) 9.0.104 9.0.104
Update drivers on the device

6. Click **[Install]** to execute the driver installation.
7. A confirmation dialog appears. Click **[Close]** to exit.

5 Vector Hardware Configuration

In this chapter you find the following information:

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5.1 General Information

Executing Vector Hardware Config

After the successful driver installation you will find the configuration application **Vector Hardware** in the Control Panel (see below). The tool gives you information about the connected and installed Vector devices. There are also several settings that can be changed.

Figure 14: Icon in Control Panel

Control Panel Windows 7

> Category view
Windows Start | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.

> Symbols view
Windows Start | Control Panel,
click **Vector Hardware** in the list.

Control Panel Windows 8.1

> Category view
<Windows key>+<X> | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.

> Symbols view
<Windows key>+<X> | Control Panel,
click **Vector Hardware** in the list.

Control Panel Windows 10

> Category view
<Windows key>+<X> | Control Panel | Hardware and Sound,
click **Vector Hardware** in the list.

> Symbols view
<Windows key>+<X> | Control Panel,
click **Vector Hardware** in the list.

5.2 Tool Description

5.2.1 Introduction

Vector Hardware Config

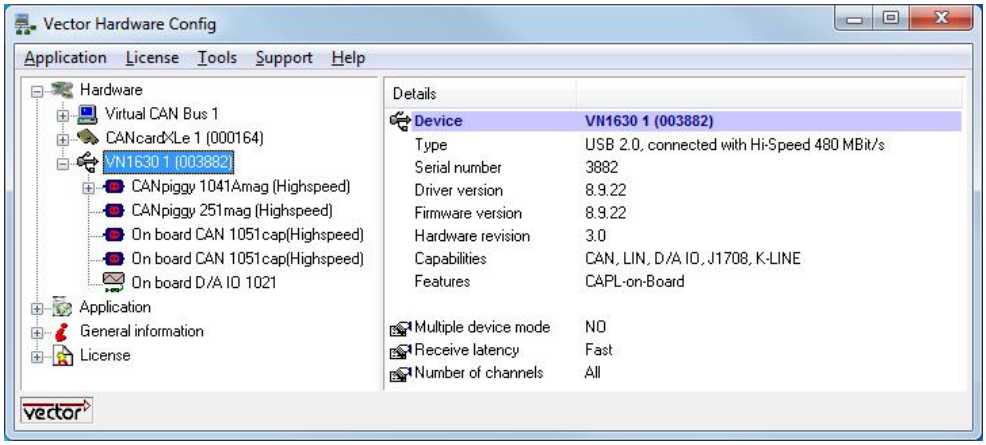

Figure 15: General view of Vector Hardware Config

Logical and physical channels

Vector Hardware Config enables the channel configuration between installed Vector devices and applications. Applications use so-called logical channels which are hardware independent and have to be assigned to real hardware channels.

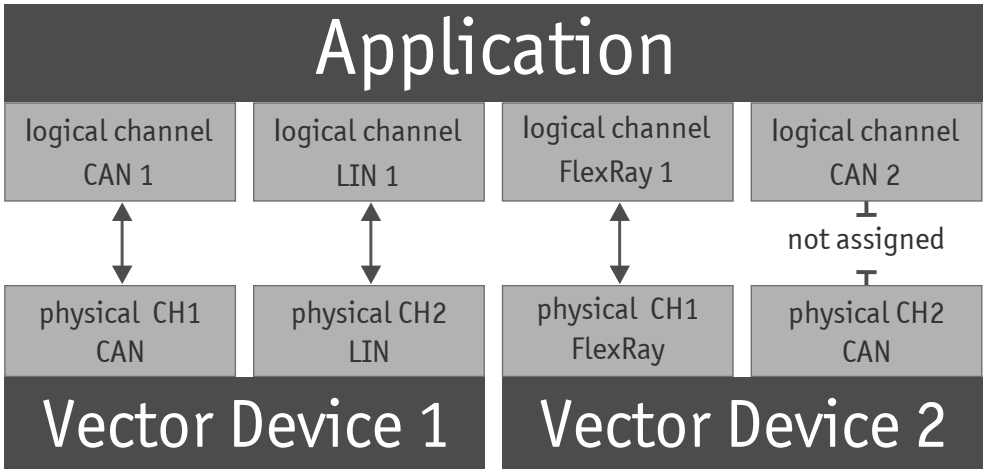

Figure 16: Concept of channel assignments

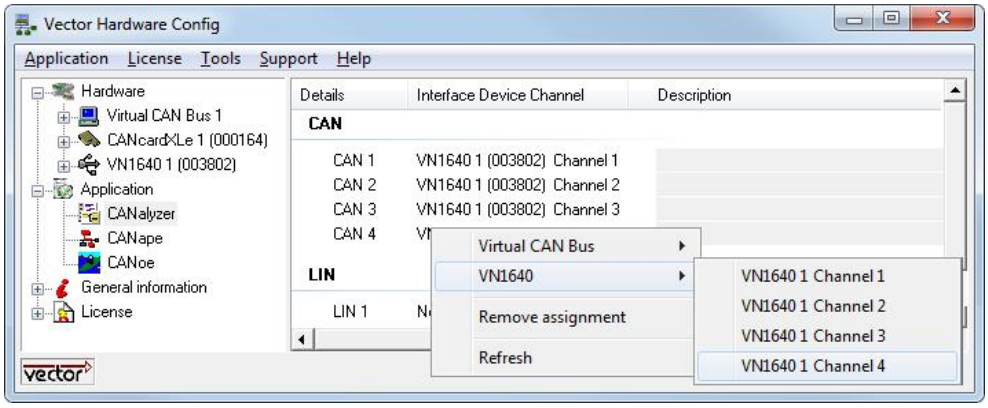

Figure 17: Channel assignment in Vector Hardware Config

5.2.2 Tree View

Accessing Vector devices

The tool is split into two windows. The left window has a tree view and lets you access the installed Vector devices, the right window displays the details of the selection. The following nodes are available in the tree view:

Hardware

The **Hardware** section lists the installed Vector devices. Each device item has physical channels which can be assigned to any number of logical channels (e. g. CANalyzer CAN 1). A logical channel can be assigned to only one physical channel.

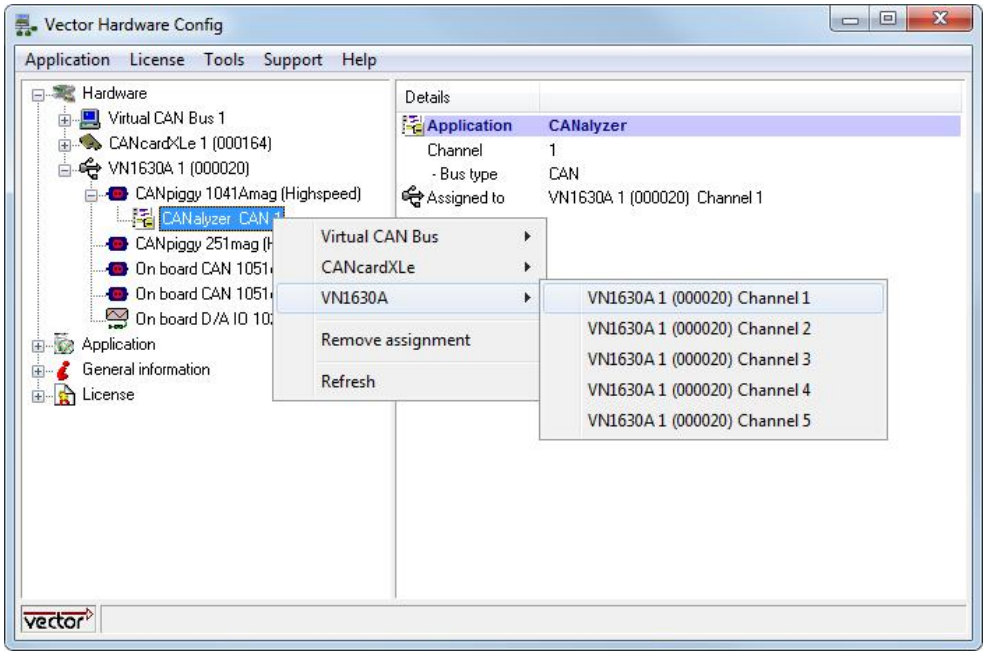

Figure 18: Hardware

Application

In **Application**, all available applications are displayed in a tree view. According to each application, the assignments of logical and physical channels are displayed in the right part of the window. If no assignment exists, the information **Not assigned** appears. The assignment can be edited via a right-click. An optional description can be entered in the text field.

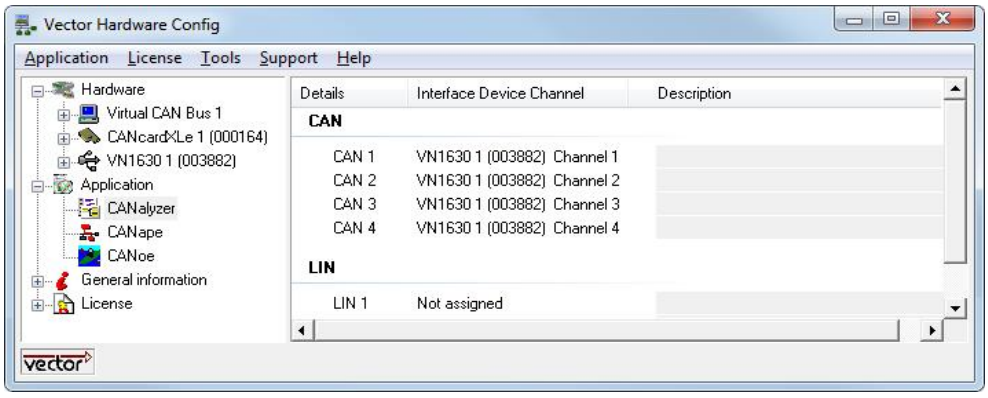

Figure 19: Application

General information

General information contains overall information on Vector devices and applications, e. g. software time synchronization, transmit queue size, configurations flags, the number of virtual CAN devices or the driver status.

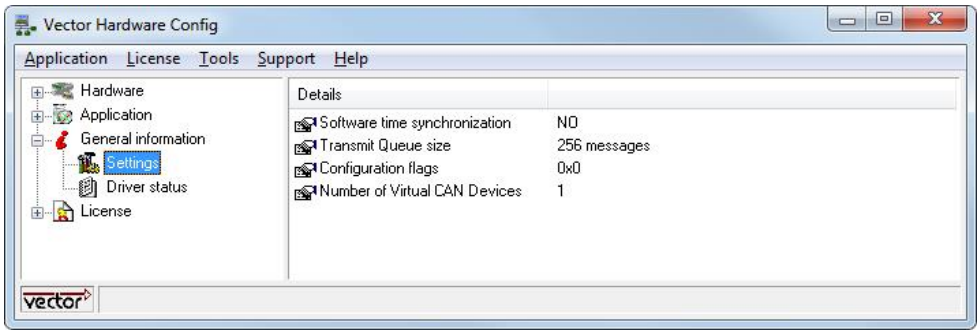

Figure 20: General information

License

The **License** section contains information on all current available licenses (Vector bus devices, Vector License USB dongle devices).

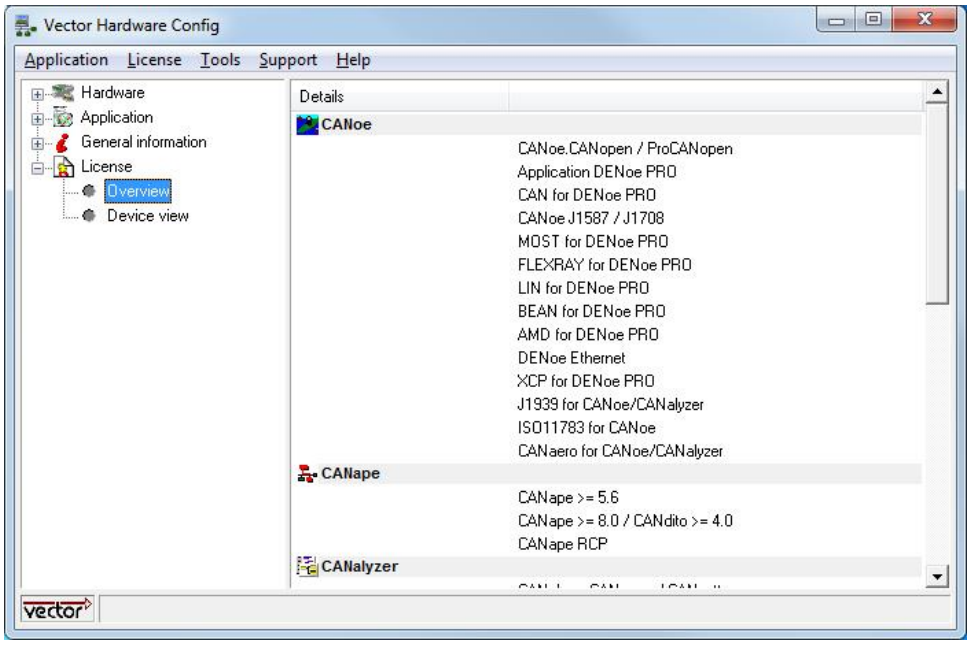

Figure 21: License

Reference: You will find a detailed description of **Vector Hardware Config** in the online help **(Help | Contents)**.

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